Mobile Device Platforms

TCO Comparison of Enterprise Mobile Solutions: RIM BlackBerry 4.X and Microsoft Windows Mobile 5.0 Messaging and Security Feature Pack

Updated in May 2007 to include results of Wipro's spring 2007 survey of Exchange Server 2003 enterprise customers.
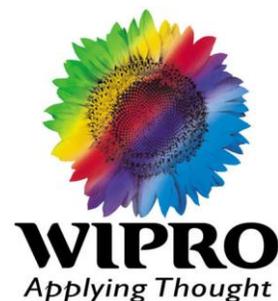
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About Wipro Product Strategy & Architecture Practice

The Wipro Product Strategy & Architecture (PSA) practice is a division of Wipro Technologies, a global technology services division of Wipro Ltd. (NYSE-WIT). Wipro's PSA practice has more than 12 years experience in researching, analyzing, and documenting the business value of technology solutions. Wipro's PSA practice helps enterprises and technology vendors develop innovative and effective product and IT strategies that enable them to expand their market opportunities, extend their competitive advantage and economize their business operations.

In addition to consulting to technology vendors, PSA practice consultants and technologists work with global enterprises and service providers in architecting and implementing large-scale systems. This practical hands-on experience gives Wipro's PSA practice consultants and technical architects first-hand knowledge that informs their business analysis work.

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Executive Summary

IT managers are increasingly being asked to provide access to corporate email, business applications, and other critical network resources via mobile devices. The cost of providing and supporting access to these resources is significant and IT managers should give careful consideration to the associated costs and capabilities before deploying an enterprise mobile solution.

Projected 3 Year Total Cost of Ownership per User for Mobile Messaging with Exchange Server 2003
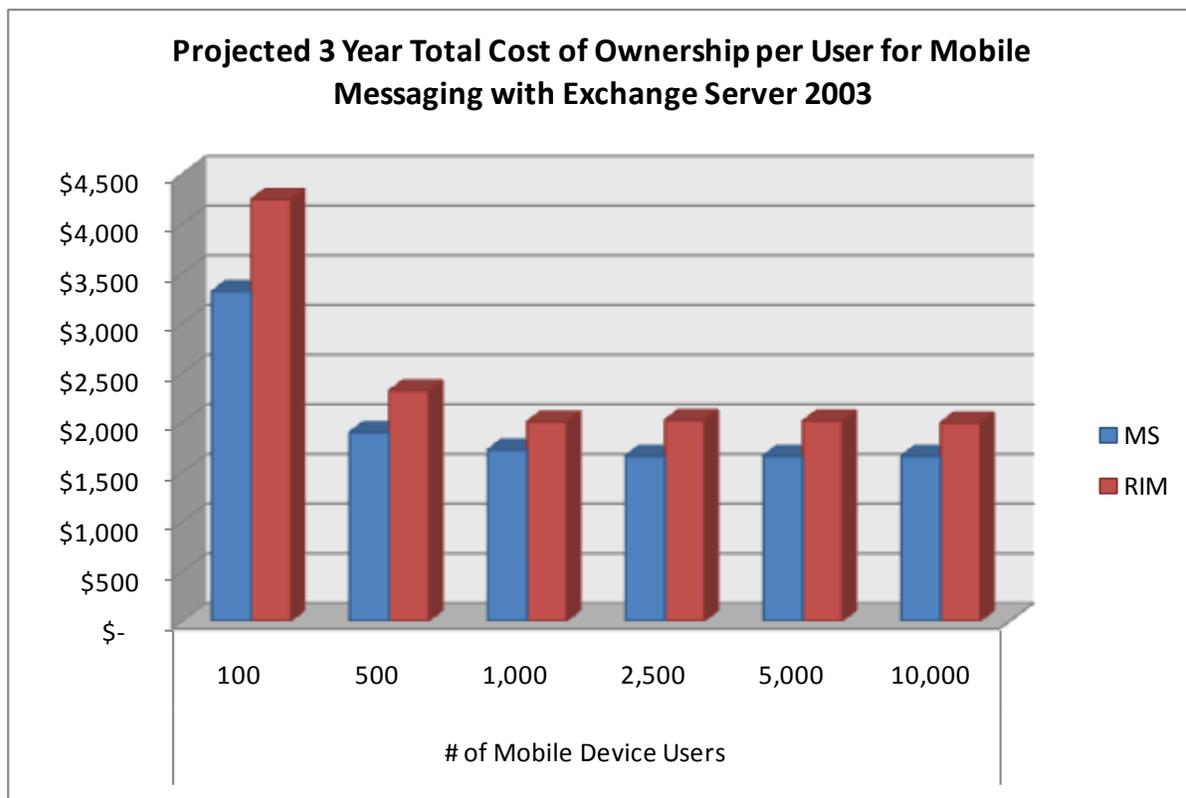
Figure 1: Mobile Platform 3-Yearly Projected Total Cost of Ownership per User

3 Year average per user	100	500	1,000	2,500	5,000	10,000
MS	$ 3,317	$ 1,899	$ 1,722	$ 1,661	$ 1,661	$ 1,661
RIM	$ 4,243	$ 2,316	$ 2,005	$ 2,021	$ 2,013	$ 1,996
RIM $ vs MS $	28%	22%	16%	22%	21%	20%

In the fall of 2005, Wipro Technologies, a leader in the IT services and consulting industry, conducted a comparative lab based study of two competing Exchange Server 2003 SP2 mobile platforms: Microsoft Windows Mobile 5.0 Messaging and Security Feature Pack (MSFP) and RIM BlackBerry Enterprise Server 4.0.

Wipro conducted detailed testing of both platforms in a simulated production environment and extrapolated the efforts and costs obtained from the lab environment to project the total cost of ownership (TCO) of managing each mobile platform in an enterprise production setting. To validate the lab data, Wipro also conducted interviews with enterprise organizations with large RIM BlackBerry deployments.

The purpose of the study was to quantify the costs of deploying and supporting a mobile environment and to provide a comparison of functional differences of IT administration, user functionality and security features. The results of the study were published in an October 2005 white paper[1].

In the spring of 2007, Wipro Technologies' Product Strategy & Architecture practice surveyed over 160 enterprise customers using Exchange Server 2003 SP2 who had deployed Windows Mobile 5.0 or RIM BES 4.X solutions to gather actual operational and TCO metrics associated with each mobile solution. The results of the Wipro's spring 2007 survey have been incorporated into this revised TCO white paper.

Microsoft has recently released its next version of the Windows Mobile operating system, Windows Mobile 6. At the time of this spring 2007 survey, Windows Mobile 6 was not widely deployed in enterprise customer environments so Wipro maintained the survey focus on the Windows Mobile 5.0 solution. Wipro Technology's initial review of Windows Mobile 6 indicates that it has all the same characteristics as Windows Mobile 5.0 from a TCO perspective and when used with more recent releases of Microsoft's server products, may have the potential to lower TCO and increase performance and scalability in the corporate email environment. Wipro's Product Strategy & Architecture practice will examine the Windows Mobile 6 solution in the near future.

The updated results of our study once again highlight a number of distinct advantages of Microsoft Windows Mobile 5.0 MSFP solution over the RIM BlackBerry solution in the areas of:

- **Lower TCO:** The TCO of the Windows Mobile platform is 20% - 28% lower than that of an equivalent RIM BlackBerry platform over a three-year period.
- **Fewer Infrastructure Components:** There is a significant difference in fixed cost between the Windows Mobile 5.0 MSFP and the RIM BlackBerry environment due to the additional infrastructure required for the BES Servers, SQL Servers and additional Exchange 2003 backend servers.
- **Lower Support Costs:** The infrastructure necessary for the RIM BlackBerry environment requires additional IT support and management effort.
- **Tighter Integration with Exchange Server 2003:** Windows Mobile 5.0 MSFP takes advantage of Exchange Server 2003's mobile support technology providing IT administrators a single environment to manage.
- **Larger Application Selection:** Numerous 3rd Party application vendors and a familiar .Net development environment provide Windows Mobile 5.0 MSFP customers with a wide variety of choices when expanding the mobile platform to support line-of-business applications.

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[1] **Mobile Device Platforms:** A Comparison of RIM BlackBerry 4.0 and Microsoft Windows Mobile 5.0 Messaging and Security Feature Pack Enterprise Mobile Solutions

Introduction

Mobile phones have evolved from audio only devices to multi-function handsets capable of supporting email, Internet connectivity and access to line-of-business applications. As phone features have improved, employee demand for mobile access to corporate email, business applications, and other critical business information has increased dramatically.

The benefits of providing mobile access to corporate email and business applications are not without risk or cost implications. IT managers should evaluate the decision to invest in mobile access based on the usability and administration features of the mobile devices, and the administration and security capabilities of the underlying environment. From a device perspective, the features must support user access to data sources, personal customization options for ease of use, and administrative functions to coordinate enterprise policies with device usage. While the administration capabilities must provide IT resources with the proper tools to support and control mobile devices, most importantly, the security capabilities of the mobile environment must protect the sensitive corporate information which is stored on and transmitted by mobile devices. Businesses must find an acceptable balance between low cost, ease of use for both end users and IT staff, and security capabilities provided by the mobile platform.

To ensure that the mobile device and platform investment is effective enterprises should examine competing products in detail to understand what drives costs, how to manage the mobile environment effectively, and how to minimize exposure to security risks. In the fall of 2005, Wipro Technologies' PSA practice published a white paper analyzing the total cost of ownership (TCO) including a feature and functional comparison of both the RIM BlackBerry 4.0 and Microsoft Windows Mobile 5.0 MSFP platforms. Since the publication of that original study, both mobile platform solutions have been deployed by numerous enterprise level customers. Wipro's PSA practice updated our TCO analysis with actual operational costs and labor data from enterprise customers having experience with both Windows Mobile 5.0 MSFP and RIM BlackBerry 4.X solutions.

This report updates Wipro PSA's original mobile platform TCO estimates with data from our spring 2007 survey. The TCO comparison focuses on a number of critical areas, including:
- Platform infrastructure
- Platform deployment
- IT administrative and management of the mobile solution

Methodology

During 2005, the Wipro PSA practice performed comparative analysis of the Windows Mobile 5.0 MSFP and the RIM BlackBerry 4.0 platforms in a test lab environment. The test lab employed all infrastructure components that a typical enterprise would deploy and was managed and supported and by dedicated Wipro IT personnel for a two month period.

Lab personnel recorded all key effort and cost metrics including hardware and software acquisition, infrastructure setup and configuration, service roll out, and ongoing maintenance and support. In addition, Wipro performed a high-level performance testing and a capacity planning assessment to capture high-level infrastructure requirements and costs.

To validate the original cost data generated in the lab, the Wipro PSA team conducted 10 in-depth interviews with senior IT managers of enterprises that had already deployed the RIM BlackBerry 4.X solutions. Wipro also conducted an in-depth interview with Microsoft which had deployed Windows Mobile 5.0 MSFP solution internally to over 2,000 users. Each interviewee managed the processes discussed in the survey for some or all of their organization's mobile deployments. Each study participant was given a 12-page survey covering all the effort and costs associated with running the each mobile environment. After the survey was completed and returned, Wipro conducted 60 minute follow-up telephone interviews with each respondent. Data gathered during the interviews was used to validate test lab data. Based on the test lab and interview data, Wipro developed a detailed financial model; the results of which drove the analysis presented in the original paper.[2]

In the spring of 2007, Wipro's PSA practice surveyed over 160 Exchange Server 2003 enterprise customers to collect operational metrics and costs on the use of Exchange Server 2003 to support simple email, Windows Mobile 5.0 MSFP and RIM BlackBerry 4.X solutions. The survey targeted large enterprises with approximately 10,000 email users and a minimum of 2,000 mobile phones deployed. Many enterprise customers utilize more than one mobile device solution to support their user community. In order to isolate TCO metrics to either the RIM or the Microsoft solution, Wipro also required that a minimum of 80% of an enterprise customer's mobile phones be on a single platform, either RIM or Microsoft. Some customer surveys with lower numbers of email users, mobile devices deployed, or mobile solution mix were accepted, but this amounted to less than 12% of all surveys.

Our survey respondents covered a wide range of email user and mobile device volumes. For email user volumes:
- Baseline enterprise customer volumes ranged from 5,000 to 100,000 with 6 customers exceeding 20,000 email users
- RIM BlackBerry customer volumes ranged from 5,000 to 300,000 with 17 customers exceeding 20,000 email users
- Windows Mobile 5.0 customer volumes ranged from 3,000 to 200,000 with 15 customers exceeding 20,000 email users.

For mobile device volumes:
- RIM BlackBerry customer volumes ranged from 1,000 to 50,000 with 19 customers exceeding 5,000 BlackBerry mobile devices deployed
- Windows Mobile 5.0 customer volumes ranged from 2,000 to 80,000 with 14 customers exceeding 5,000 Windows Mobile 5.0 devices deployed.

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[2] Microsoft Windows Mobile 5.0 MSFP beta was used in the lab. This beta version had yet to be deployed in significant numbers by enterprise customers. This paper includes updated TCO data from our subsequent survey conducted in the spring of 2007.

The table below summarizes the average email and mobile device metrics for those who participated in the survey.

	Baseline*	RIM BlackBerry	Windows Mobile 5.0
# Enterprise customers	39	71	52
Average # of email users	15,500	73,800	52,500
Average number of mobile devices	NA	11,000	13,800

*Enterprise customers with no mobile devices deployed. This group was used as a baseline for understanding the impact of mobile device deployment in RIM BlackBerry and Windows Mobile 5.0 MSFP environments

The Wipro PSA team conducted follow-up interviews with 37 survey participants across all three groups to verify survey data and probe deeper into their Exchange Server 2003 and mobile solution operations.

Our 2007 enterprise customer survey gathered data on:
- Exchange Server 2003 deployment architecture
- RIM BES deployment architecture
- Email and mobile device metrics
- IT labor to deploy and maintain Exchange Server 2003 and RIM BlackBerry environments
- Exchange Server 2003 and RIM BES performance metrics
- Email access methods used (e.g. WAN/LAN, RPC over HTTP, OWA, mobile device, etc)

The key TCO cost categories included in our survey and subsequent analysis are:
- **Deployment Costs**
  - o **Infrastructure Acquisition:** includes the procurement cost of all the infrastructure components required for the mobile environment including hardware servers, OS software, mobile platform software, database software, and any user licenses associated with any of the deployed software.
  - o **Infrastructure Setup**: labor effort and resulting cost involved in the setup and configuration of the infrastructure components
  - o **IT Helpdesk Training**: includes the cost associated with training IT and Help Desk staff to administer and support the mobile platform
  - o **Handsets:** includes the cost of comparable Windows Mobile 5.0 MSFP and BlackBerry devices
- **Operations Costs**
  - o **IT Support and Database Administration**: includes the cost of ongoing IT labor for infrastructure maintenance, database administration and escalated help desk support
  - o **Help Desk:** cost associated with number of help desk FTEs needed to manage comparable sizes of mobile environments
  - o **Data Center Server Chargeback**: the cost of hosting, running, and managing the server infrastructure
  - o **Infrastructure Maintenance**: cost of maintenance contracts for hardware and software components of the mobile solution
  - o **Technical Support:** cost of vendor technical support for the mobile platform
  - o **User Phone Plans**: what an organization will pay its service provider to provide over the air connectivity for the handset devices to the corporate environment
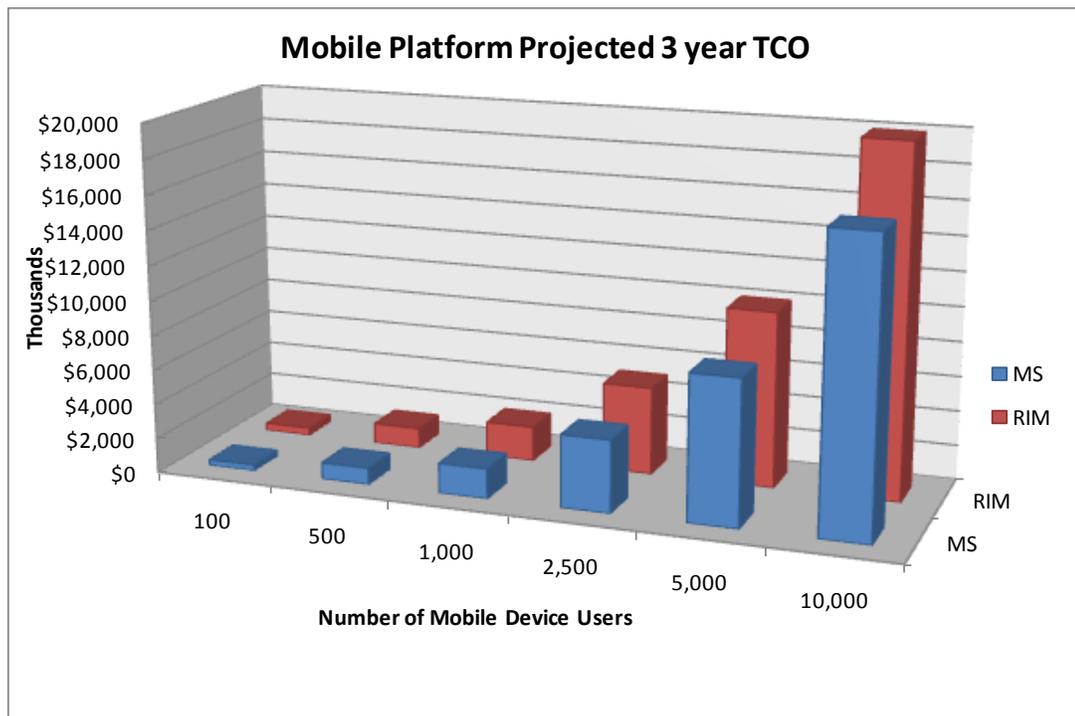
Total Cost of Ownership

This section, updated with results from our spring 2007 enterprise customer survey, provides a summary of the financial investment required to deploy and support both the RIM BlackBerry 4.X and Windows Mobile 5.0 MSFP enterprise mobile platforms. These costs include:

- Infrastructure acquisition
- Infrastructure setup
- IT support
- Data center server administration
- Help desk
- Infrastructure software maintenance
- Technical support[3]
- User phone plans

For purposes of the analysis, the test lab data and the data provided by survey participants was used to create a model of the costs that enterprises can expect given six user volume scenarios: 100, 500, 1,000, 2,500, 5,000 and 10,000 mobile device users. Each scenario assumes the modeled enterprise has previously deployed Exchange Server 2003 SP2 to its user community and has yet to deploy any infrastructure components to support the RIM BlackBerry or Windows Mobile 5.0. solutions.

Figure 2 below shows our projected 3 year TCO for each of the user base scenarios identified above.

Figure 2: Mobile Platform Projected 3 Year Total Cost of Ownership

The table below provides the cost details depicted in the chart above.

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[3] Detailed descriptions of categories are included in the Methodology section above

Mobile Platform 3 Year Projected Total Cost of Ownership						
# Users	100	500	1000	2500	5000	10000
MS	$ 331,654	$ 949,574	$ 1,721,974	$ 4,151,866	$ 8,303,731	$ 16,607,463
RIM	$ 424,278	$ 1,158,052	$ 2,004,609	$ 5,052,469	$ 10,064,861	$ 19,962,479
% Difference	28%	22%	16%	22%	21%	20%

Projected 3 Year Additional Cost of the RIM Blackberry Mobile Solution						
Total	$ 92,623	$ 208,477	$ 282,635	$ 900,604	$ 1,761,129	$ 3,355,016
Per user	$ 926	$ 417	$ 283	$ 360	$ 352	$ 336

Figure 3 below graphically displays the projected additional total costs of the RIM BlackBerry solution compared to the Microsoft Mobile 5.0 MSFP solution.
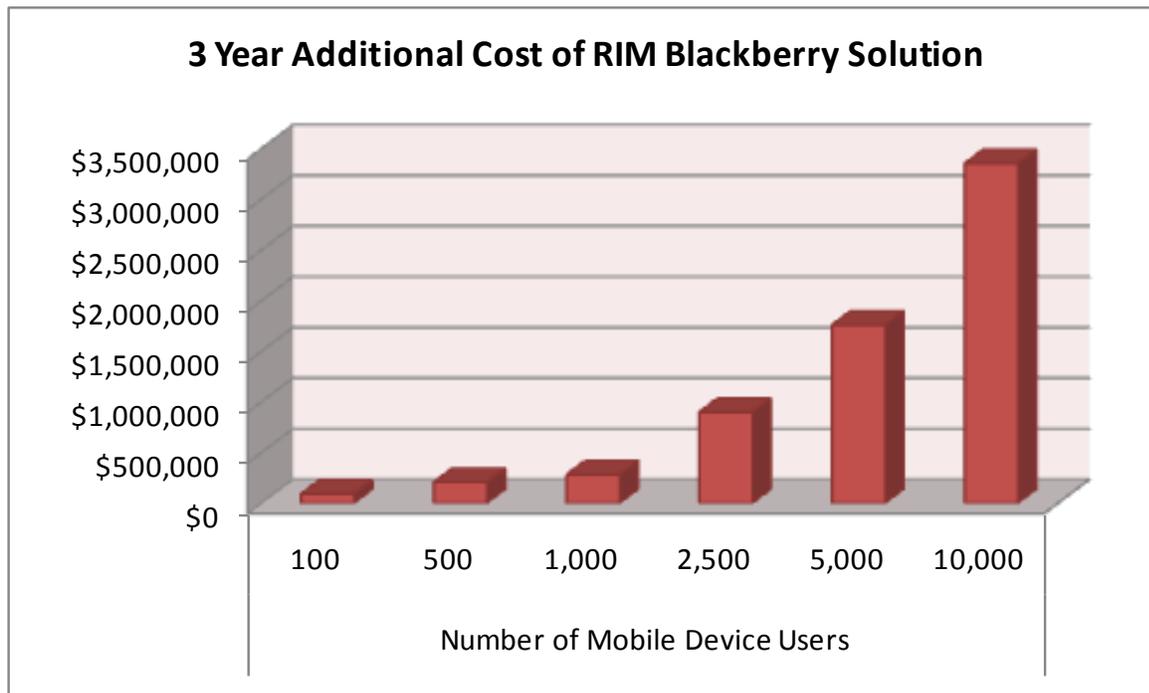

Figure 3: Projected 3 Year Additional Cost of the RIM BlackBerry Solution

Deployment Costs

This section provides a summary of the effort and investment required to deploy either a RIM BlackBerry 4.X or Windows Mobile 5.0 MSFP environment.

All infrastructure component costs in our TCO calculations are based on publicly available list prices of the hardware and software components.

Infrastructure Acquisition

Many enterprises already have appropriate Exchange Server 2003 infrastructure deployed to support corporate Outlook email clients and email access via the web using Outlook Web Access (OWA).

Results from our spring 2007 survey indicated that OWA was commonly used for email access prior to both RIM BlackBerry and Windows Mobile 5.0 MSFP solution deployments. OWA usage was very similar before and after deploying their respective mobile solutions as the table below depicts.

	OWA Usage **prior** to Mobile solution deployment		OWA Usage after Mobile solution deployment	
	% Customers	% Users*	% Customers	% Users*
RIM BlackBerry	89%	30%	89%	30%
Windows Mobile 5.0 MSFP	88%	38%	96%	38%

* Represents the % of customers reporting OWA being used by more than 50% of email users

Deploying a RIM BlackBerry mobile solution requires hardware and software infrastructure components to be deployed in addition to existing Exchange Server 2003 email environment.

Infrastructure components necessary for a RIM BlackBerry mobile solution deployment include:
- Server hardware and software to support RIM's BlackBerry Enterprise Server (BES).
  - ❖ Our survey results indicated that BES deployments averaged between 1300 and 1500 BlackBerry users per BES server.
- Server hardware and software to support Microsoft SQL Server database that houses BES mobile user data [4].
  - ❖ Our survey results showed BES customers averaged between 3000 to 3700 BlackBerry users per SQL Server instance.
- In RIM deployments of over 3000 mobile units, additional Exchange Server 2003 backend capacity may be required to maintain pre-RIM deployment email service levels.
  - ❖ Our survey results indicated that Exchange 2003 backend servers in BES customer environments supported 36% fewer email users than backend servers used by Windows Mobile 5.0 customers. This implies that as RIM customers deploy BlackBerry mobile devices, they will also likely need to deploy additional Exchange 2003 backend servers.
  - ❖ Assuming a 1 to 5 ratio of mobile devices to email users, our model estimates that as RIM customers deploy BlackBerry devices, they will need to deploy 1 additional Exchange Server 2003 server for every 6000 email users. For example, an enterprise customer with 25,000 email users will require 4 additional Exchange Server 2003 servers to support 5,000 BlackBerry mobile devices.

Figure 4 below shows the initial investment required for the additional infrastructure to deploy the RIM BlackBerry 4.X environment.

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[4] Enterprises with smaller user bases may run with MSDE, larger user bases will require SQL Server.

Additional Infrastructure cost to deploy RIM Blackberry solution
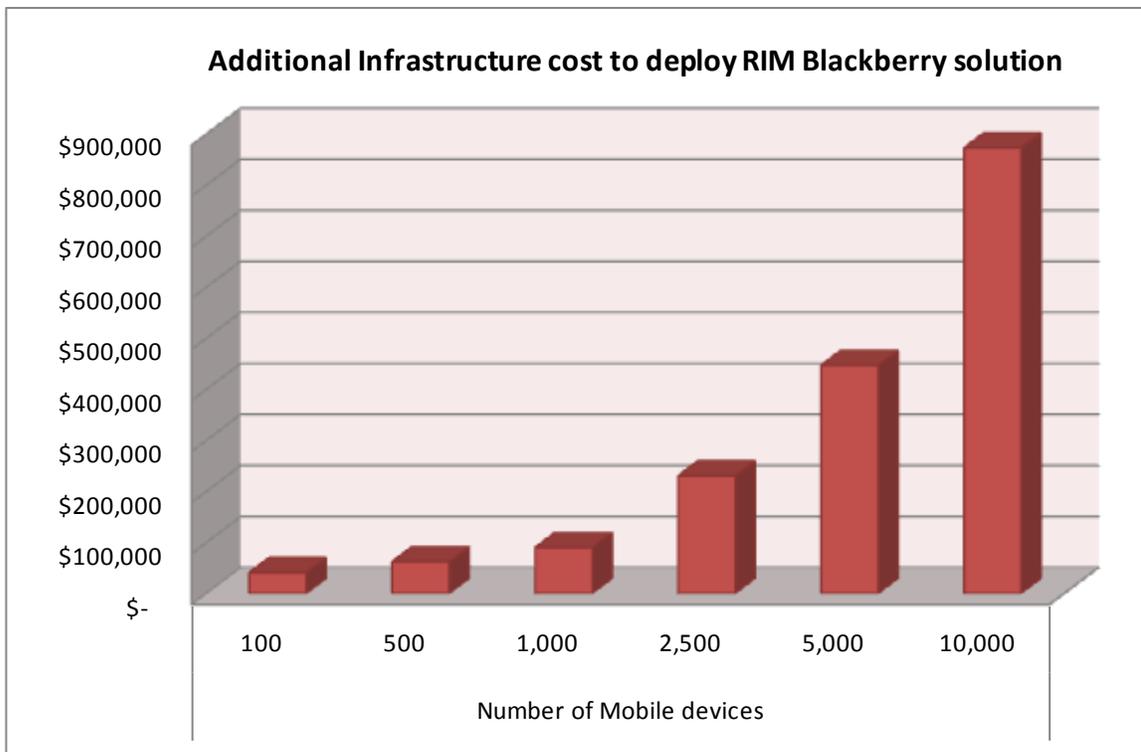
Figure 4: Additional Infrastructure cost to deploy RIM BlackBerry solution

With the release of Exchange Server 2003 SP2, Microsoft has enhanced the standard Exchange Server 2003 solution to include built-in support for the Windows Mobile 5.0 MSFP platform. The Exchange Server SP2 upgrade is available at no charge to Exchange Server 2003 customers and is easily installed into existing Exchange Server 2003 environments. Our survey results affirmed that enterprise customers deploying Windows Mobile 5.0 solutions required little to no Exchange Server 2003 infrastructure changes to support the Windows Mobile 5.0 MSFP deployment.

Infrastructure Setup

Setup time for the additional infrastructure associated with the RIM BlackBerry 4.X environment involves hardware server setup, BES software installation and configuration and the effort to test and integrate the components into the existing Exchange Server 2003 production environment. Figure 5 below shows the costs enterprises can expect in setting up the RIM BlackBerry environment.
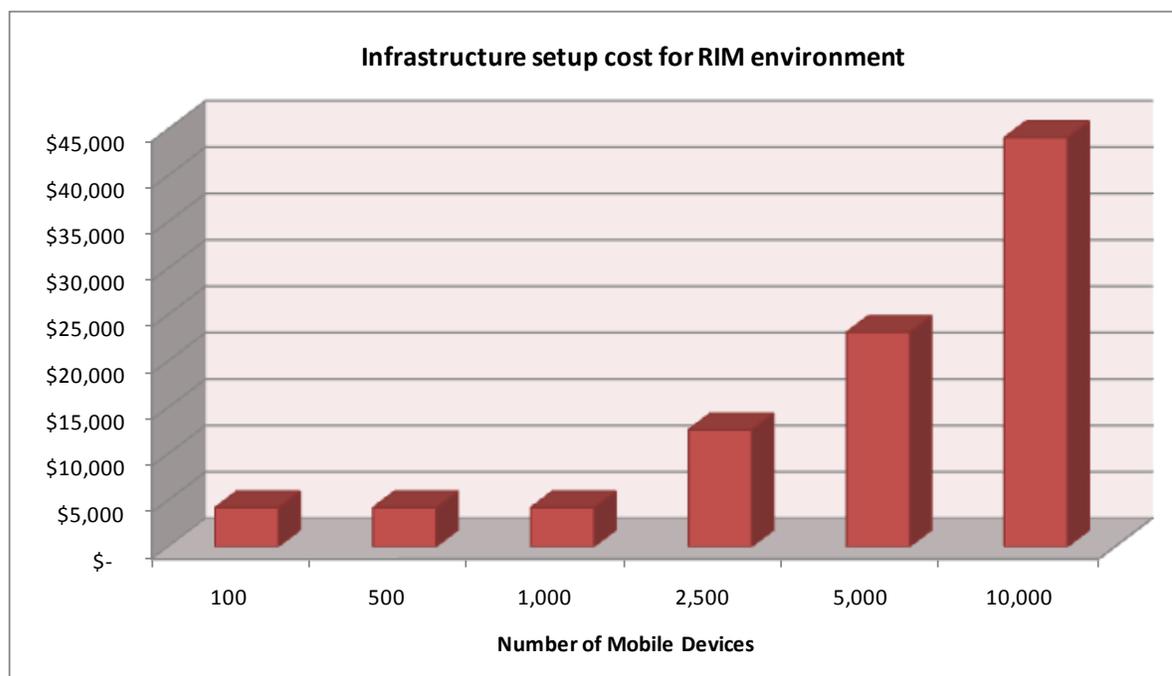
Figure 5: RIM BlackBerry environment setup costs

RIM Infrastructure Setup Costs	Number of Mobile Users					
	100	500	1,000	2,500	5,000	10,000
Exchange Backend	$0	$0	$0	$4,200	$8,400	$16,800
BES Servers	$2,100	$2,100	$2,100	$6,300	$10,500	$21,000
SQL Server	$2,100	$2,100	$2,100	$2,100	$4,200	$6,300
Totals	$4,200	$4,200	$4,200	$12,600	$23,100	$44,100

The cost of handsets varies significantly based on features selected by the enterprise or the end-user and on the enterprises agreement with mobile operator and/or OEM. The cost of handsets is a significant component of the mobile platform TCO; for the purposes of this analysis, it has been included in the calculations for *both* environments at an average cost of $275 for each mobile device.
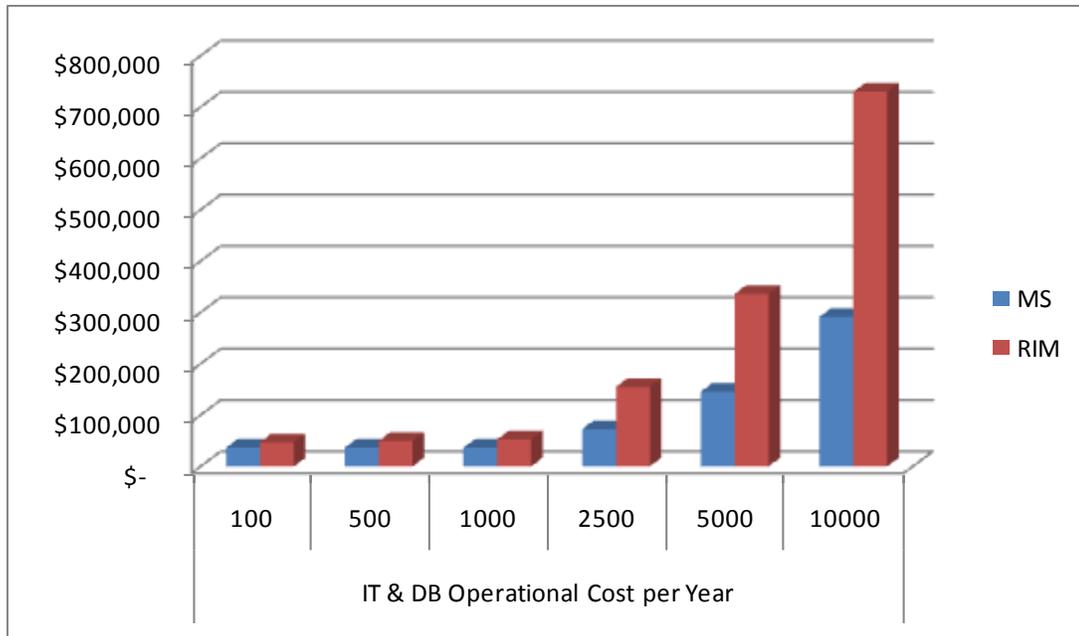
Operating Costs

This section provides a summary of the effort and costs required to support RIM BlackBerry 4.X and Windows Mobile 5.0 MSFP environments. Operating costs presented in the original version of this white paper were based on effort measured in our lab environment. We have updated the operating costs in this analysis based on IT labor metrics reported by surveyed enterprise customers. Average IT wages are taken from our internal Wipro benchmark database.

IT Support

IT support includes day-to-day effort to maintain the mobile solution's infrastructure components and to solve user problems escalated beyond the Level 1 help desk support calls. Based on lab and survey data, enterprises can expect IT support costs to be 20% to 30% higher for the RIM BlackBerry mobile solution than for the Windows Mobile 5.0 MSFP solution (Figure 6). The higher costs are due to four factors:

- Additional infrastructure components in the RIM BlackBerry 4.X environment require more IT staff effort to operate and support. These components include hardware servers, BES software servers, Microsoft SQL Server, and potentially additional Exchange backend servers.
- Coordination of the RIM and Exchange server environments for user provisioning, messaging performance and scalability
- Increased IT Level 2/3 effort to resolve user support calls escalated beyond Level 1
- Vendor service contracts (i.e. RIM TSupport vs. MS Premier) – details of this support category are available later in this section

Figure 6: Yearly IT Support and Database Administration Costs

Data Center Server Administration

Data center server administration includes the cost of running and managing the hardware servers and operating system infrastructure. There is no additional cost associated with maintaining a Windows Mobile 5.0 MSFP environment as it utilizes the same Exchange servers that organizations use for operating their email systems. For the RIM environment there are administration costs associated with the additional BES, database, and Exchange servers required to support RIM BlackBerry solution. These costs are not significant but are included in the TCO analysis.

Help Desk

Help desk costs include the total effort expended by help desk staff to handle the incoming calls from mobile users and is dependent both on the number of incoming calls and the effort required to resolve each call. Survey data collected indicated that the number of calls and call duration were similar for each mobile platform. For each environment, the number of calls averaged slightly less than 1 call per user per month and required approximately 30 minutes per call in resolution effort.

Infrastructure Software Maintenance

Microsoft's software maintenance cost for the mobile platform is included in the customer's existing licensing agreement for its Exchange server environment.

In the case of RIM however this cost increases linearly with the number of copies of BES and SQL Server the enterprise purchases. Currently, each copy of BES supports a maximum of 2000 end users and requires a yearly maintenance agreement to assure the latest version of BES is available to the enterprise customer. Enterprise customers may also need to include the cost of Microsoft's SQL Server and related yearly maintenance in addition to the costs associated with the BES copies.

Technical Support

Technical support for the RIM BlackBerry 4.X environment is provided through a purchased TSupport contract from RIM. The cost of the contract is based on the number of BES licenses the enterprise has purchased, the number of BlackBerry devices covered by the support, the time of day that technical support calls are allowed, and the number of enterprise IT staff authorized to contact RIM's technical support group. The cost of RIM technical support ranges from 3% to 8% of an enterprise's mobile platform TCO. Technical support for the Windows Mobile 5.0 MSFP platform is provided through Microsoft Premier Support Agreements already in place for many large existing Exchange Server 2003 environments. The technical support costs for the RIM BlackBerry platform are modeled below.
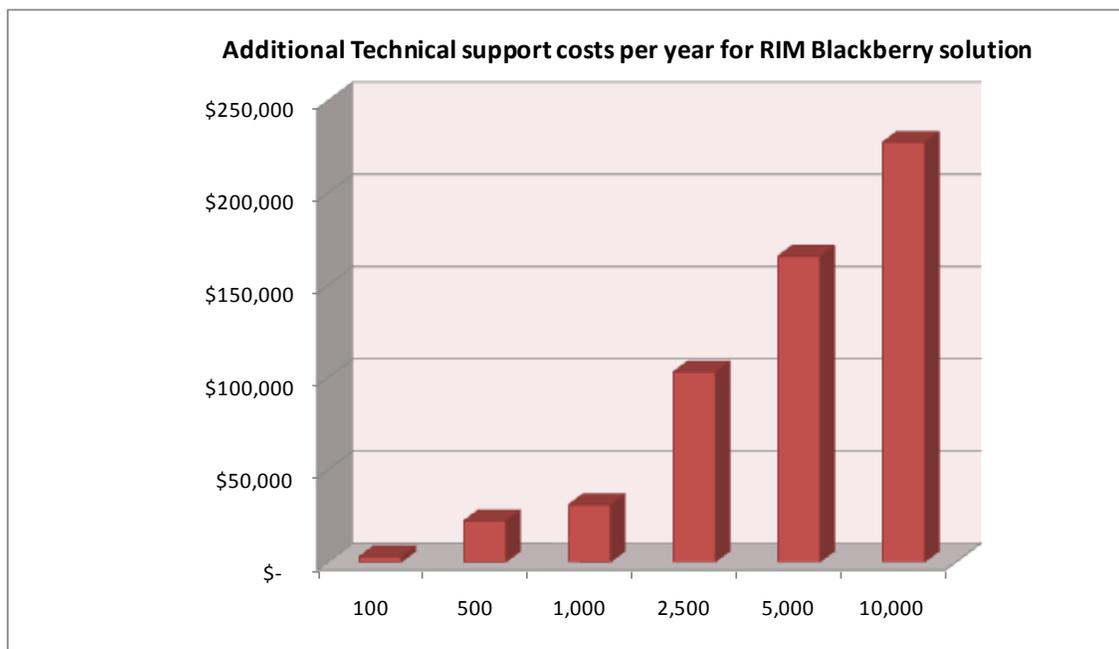

Figure 7: RIM BlackBerry yearly Technical Support Cost

User Phone Plans

Phone plans vary widely based on voice minutes, data volumes, and agreements between enterprises and mobile operators. As with the mobile device, our TCO model assumes the same cost for each solution's mobile data usage, $40/month/user. The monthly subscription fee for the dedicated RIM data plan and for a flat rate data plan for Windows Mobile can be lower or higher than the assumed $40/month/user.

Comparative Analysis

The Total Cost of Ownership for any enterprise IT solution will include initial deployment costs to acquire and configure appropriate infrastructure components in addition to the ongoing operational costs to maintain the infrastructure and support the user base. Analysis indicates that the TCO of the RIM BlackBerry 4.X environment will be consistently higher than for a similar Windows Mobile 5.0 MSFP solution. This difference will range from 28% more expensive for a 100 user base to 20% higher for a 10,000 user base. Figure 8 below depicts the cost differential for a 3-year TCO as the user base grows from 100 to 10,000 users. The accompanying table provides the cost details.
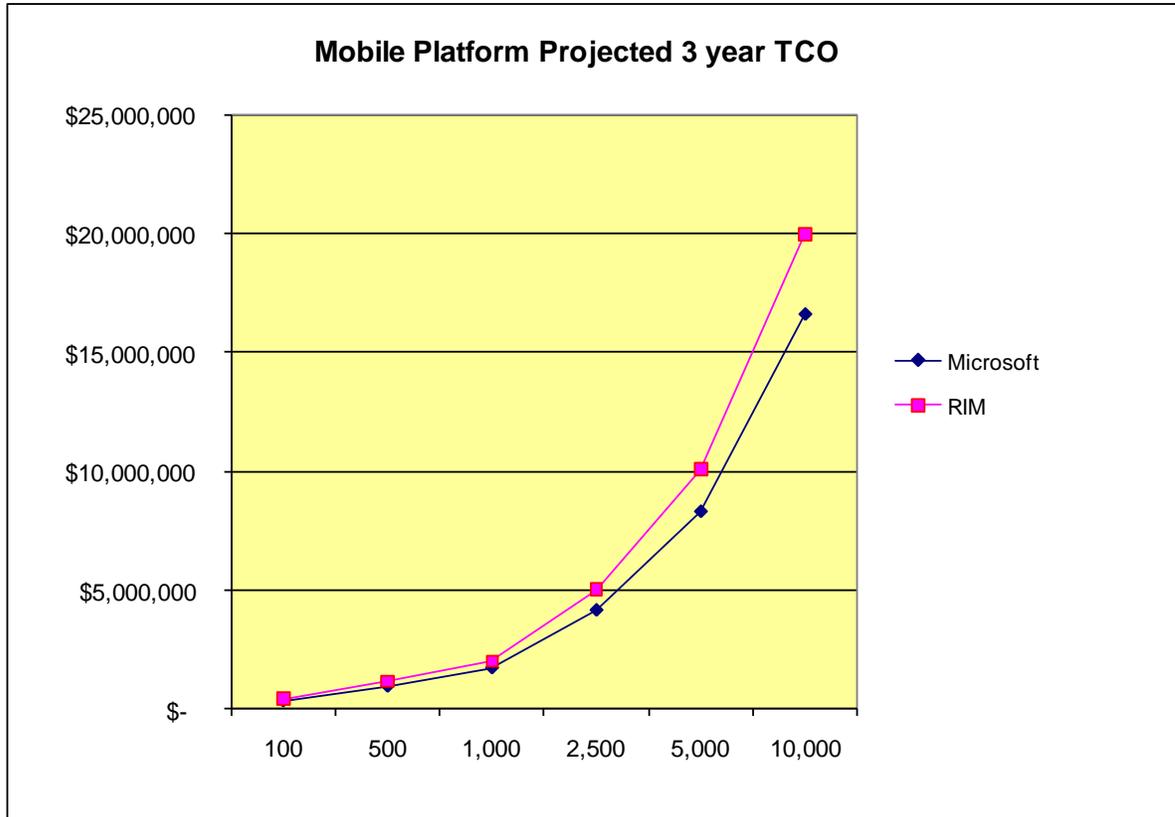

Figure 8: 3 year Projected TCO Cost for 100 to 10,000 mobile device users

Mobile Platform 3 Year Projected Total Cost of Ownership						
# Users	100	500	1000	2500	5000	10000
MS	$ 331,654	$ 949,574	$ 1,721,974	$ 4,151,866	$ 8,303,731	$ 16,607,463
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Projected 3 Year Additional Cost of the RIM Blackberry Mobile Solution						
Total	$ 92,623	$ 208,477	$ 282,635	$ 900,604	$ 1,761,129	$ 3,355,016
Per user	$ 926	$ 417	$ 283	$ 360	$ 352	$ 336

Initial acquisition and deployment costs per user differ significantly between the two mobile platform solutions. For small user deployments, for example, the RIM BlackBerry 4.X infrastructure acquisition and deployment will be twice as expensive as the Microsoft Windows

Mobile 5.0 MSFP solution. Figure 9 below depicts the infrastructure/deployment cost per user for our six enterprise scenarios.
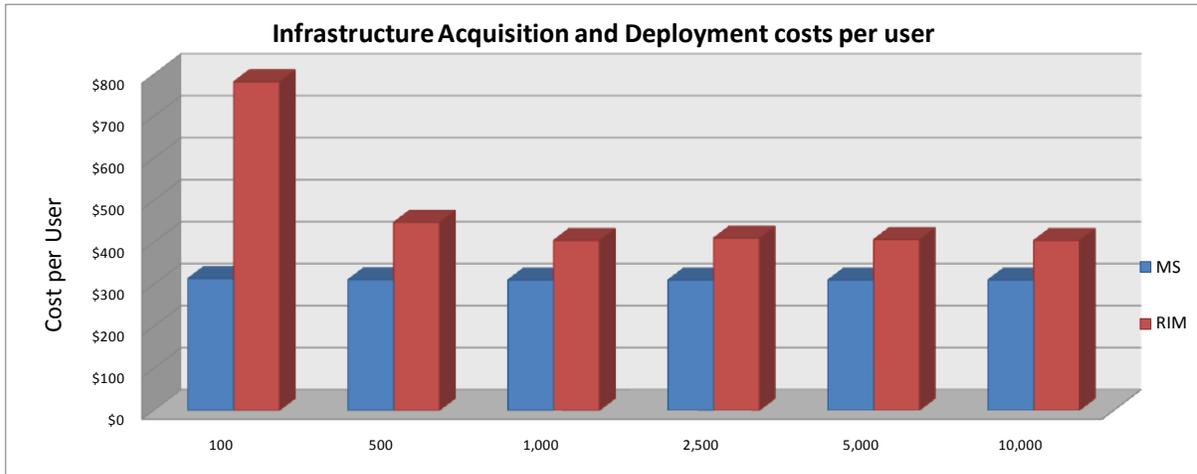
Figure 9: Infrastructure Acquisition and Deployment cost per user

	100	500	1,000	2,500	5,000	10,000
MS	$314	$311	$310	$310	$310	$310
RIM	$782	$447	$405	$410	$407	$404

Corporate email is increasingly becoming the primary communications choice for business information exchange within and among businesses. A user's email client is a critical portal into everyday business activities. Each corporate environment has unique performance demands that are difficult to define and thus challenge IT's ability to estimate email capacity requirements. In the spring 2007 survey, Wipro' PSA team asked enterprise customers how they estimated the capacity requirements of their Exchange Server 2003 environment. The results indicated the sizing approach is more of an art than a science. Our survey respondents indicated that:

- 82% used a trial and error approach with production level performance monitoring to alert the IT staff of undersized capacity
- 18% relied on hardware and/or software vendor recommendation for their initial configuration and then monitored performance activity to adjust capacity as needed.

The table below provides data about production deployment sizing from our survey participants. Wipro recognizes that each corporate email environment is unique based on the industry, work habits of the user community, and the amount of data flowing in and out of the corporation. The following capacity figures should be used as guidelines rather than hard facts. Server size and configuration will also influence capacity planning. Although the server specifics varied slightly across all our survey respondents, the typical server supporting Exchange Server 2003, BES and SQL Server included 2 CPUs @2+GHz, 2 GB memory and a mix of internal and external SAN mailbox storage.

	Baseline*	RIM BlackBerry	Windows Mobile 5.0
# email users per Exchange backend server	2900	2200	3500
# users per BES server	NA	1300	NA
# users per SQL Server**	NA	3400	NA

* Base line survey respondents had no mobile devices deployed
** SQL Server function was to support the BES environment

The table above identifies the average number of email users per Exchange backend server, but as noted above each customer situation will vary. The range of email user volumes per Exchange backend server included:

- Baseline customer volume ranged from 1,000 to 6,000 email users per Exchange backend server
- RIM BlackBerry customer email volumes ranged from 1,000 to 3,750 email users per Exchange backend server
- Windows Mobile 5.0 customer email volumes ranged from 1,100 to 7,500 email users per Exchange backend server.

Wipro was surprised that Exchange Server 2003 in the Windows Mobile 5.0 environment supported more email users on average than the Baseline environment. Although the survey data could not provide a definitive reason for this, Wipro surmises that the use of Windows Mobile 5.0 mobile devices potentially reduced the MAPI email requests from the desktop Outlook client, resulting in the ability for the Exchange Server 2003 backend server to support more email users.

The survey results clearly indicate that Exchange Server 2003 backend servers support fewer email users in the RIM BlackBerry environment, on average, than in a Windows Mobile 5.0 environment. Supporting 36% fewer email users will require RIM BlackBerry customers to deploy additional Exchange Server 2003 servers to maintain performance levels similar to those prior to their BlackBerry mobile device deployment. Although the estimate of the number of email users a typical Exchange Server 2003 server can support is survey rather than performance based, Exchange Server 2003 administrators surveyed confirmed their need to increase Exchange Server 2003 capacity as BlackBerry mobile devices were deployed.

In developing our TCO model, Wipro used the numbers in the above table to estimate the number of Exchange, BES, and SQL servers required for our 6 user scenarios.

Enterprises with 2500 or fewer BlackBerry users will probably not require additional Exchange server capacity. Enterprises deploying a RIM solution with greater than 2500 BlackBerry users should closely monitor Exchange server performance and be ready to add Exchange server capacity in order to maintain the same Exchange server performance/capacity ratios that existed prior to the RIM BlackBerry deployment.

Capacity planning information for Exchange servers supporting a BES 4.1 implementation can be found in BlackBerry technical documentation, "Performance Characteristics: BlackBerry Enterprise Server Version 4.1 for Microsoft Exchange."

From an ongoing operations perspective significant cost differences emerge as well. As the user population grows, the cost of managing the RIM environment increases and the effort devoted to the day-to-day management and upkeep of the RIM solution is considerably higher when compared to the Windows Mobile 5.0 MSFP environment. Figure 10 below shows the operating costs per user at various user base levels.
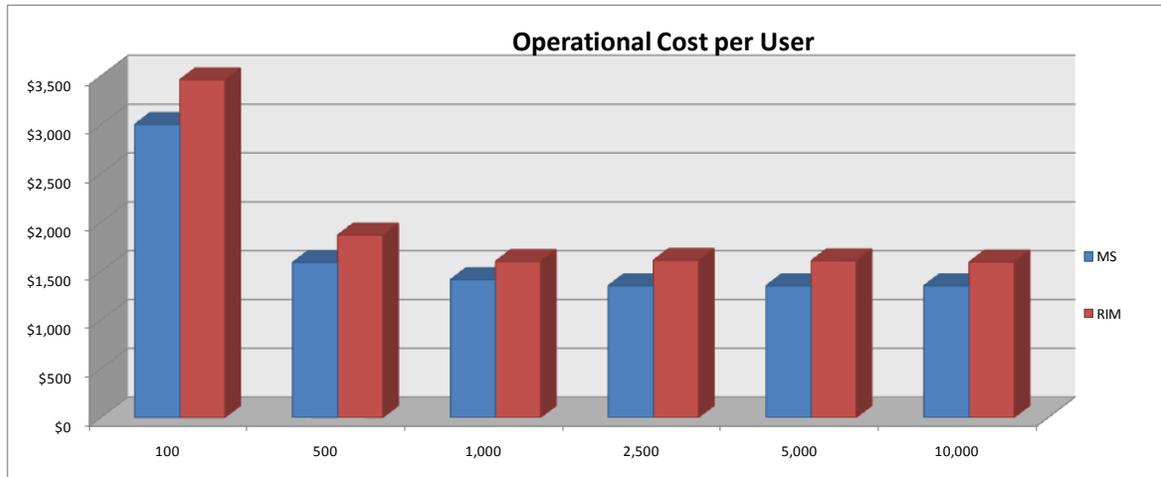

Figure 10: Operating Costs per User

	100	500	1,000	2,500	5,000	10,000
MS	$3,003	$1,588	$1,412	$1,351	$1,351	$1,351
RIM	$3,460	$1,869	$1,600	$1,611	$1,606	$1,592

The difference in operating cost between the two environments is the result of higher IT support demands for additional infrastructure components in the RIM environment and the additional software maintenance agreement required with the RIM BlackBerry 4.X solution.

Conclusions & Recommendations

The enterprise wireless mobile solution market will continue to grow in the years to come. In addition to the strong market demand for enterprise mobile solutions, the technology that enables mobile access to email and corporate network resources continues to mature and become more powerful. Email access from mobile devices has been the gateway to the mobile environment for many enterprises. In the years to come, the focus will move beyond email to mobile applications that leverage corporate network resources; applications which will deliver information to mobile workers where and when they need it.

The RIM BlackBerry 4.X solution provides users with the appropriate functionality to manage email and PIM data from a mobile device. The RIM BES application includes a comprehensive set of functions and controls for deploying and managing BlackBerry devices and users. The functionality and manageability of this platform enabled the RIM BlackBerry 4.X solution to take the early lead in mobile email technology.

However, with the introduction of Windows Mobile platforms, 5.0 MSFP and 6.0, and Exchange Server 2003 SP2, Microsoft has leveled the technology playing field.

Enterprises planning to deploy mobile solutions should consider the following:

- The Microsoft solution will minimize both startup and ongoing operational costs as it leverages existing Exchange Server 2003 infrastructure and IT knowledge.
- The Microsoft solution provides more options from third party applications and enables more rapid application development leveraging the .Net environment.
- The Microsoft solution will scale up to support the growth of mobile users within the existing Exchange Server 2003 environment without the need to continually acquire, install and manage additional infrastructure components.